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10/615,389	07/09/2003	Motoki Kakui	50212-514	8492

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MCDERMOTT, WILL & EMERY  
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Washington, DC 20005-3096

EXAMINER

DIACOU, ARI M

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/615,389  
Filing Date: July 09, 2003  
Appellant(s): KAKUI ET AL.

**MAILED**

**OCT 23 2006**

**GROUP 3000**

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Arthur Steiner  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 9-19-2006 appealing from the Office action  
mailed 2-3-2006.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

No evidence is relied upon by the examiner in the rejection of the claims under appeal.

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 39 and 41 are rejected under 35 U.S.C. 112, fourth paragraph, as being dependent on a canceled base claim. 35 U.S.C. 112, fourth paragraph requires that a dependent claim include all the limitations of the base claim and be further limiting—claims 39 and 41 do neither, and are therefore rejected.

Claims 2-12, 28-34, 39, 41, and 45-79 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

As amended the applicant claims “for collectively amplifying signal light having multiplexed a plurality of channels in a single **wavelength band** including a wavelength region having a wavelength of 1610 nm **or longer**” This is an open ended numerical range that is inclusive of  $f=0$ , which is mathematically undefined. Aware of this physical impossibility, the examiner understands this limitation to be inclusive of IR, microwave and radio radiation. See MPEP § 2164.01.

The applicant does not disclose how or in what manner the amplifiers of claims 2-79, are able to amplify signals at 1611 nm as well as those belonging to the following classifications:

- Microwave Radiation

- Radio waves

Claims 8 and 10 are similarly rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

As amended the applicant claims "wherein the bandwidth **exceeds** 50 nm." This is an open ended numerical range that is inclusive of  $f=\infty$  and  $f=0$ , both of which are mathematically undefined. Since this is a bandwidth of light centered about a frequency, the claim is therefore interpreted as reading on an amplifier which uses a population inversion to amplify a signal of any frequency in the electromagnetic spectrum. See MPEP § 2164.01.

The applicant does not disclose how or in what manner the amplifiers of claims 8 or 10 are able to amplify signals belonging to the following classifications:

- Gamma rays
- X-rays
- Ultraviolet radiation
- Radiation with a wavelength between 380 nm and 740 nm
- Microwave Radiation
- Radio waves

Claims 2-10, 28-34, and 45-65 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for an amplifier with a gain non-uniformity of 18%\*, does not reasonably provide enablement for a gain non-uniformity of

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0%\*. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. Reducing the gain non-uniformity is one of the principle concerns in the optical amplifier art. The inventions of tomorrow which overcome the inevitable shortcomings of the inventions of today cannot be construed to infringe on the prior art simply because they fall on the desirable side of an open-ended figure-of-merit range.

\* It is noted here that when the applicant (as well as others skilled in the art) measure percent non-uniformity, they intend to measure  $\Delta G$  on a logarithmic (that is in dBm) not linear (a unitless ratio) scale.

#### **(10) Response to Arguments**

Before delving into rebuttals of specific arguments, generally speaking, this appeal is about open-ended ranges. Can an applicant claim a range that really is infinite? The examiner has twice said, "No, you don't have support for all the things that your claim encompasses." The applicant has twice argued (with great generalization) "I don't have to, one of skill in the art would know what I meant, or at the very least, know I didn't mean the things Examiner alleged were encompassed by the claims." The MPEP provides no guidance on this issue, since 2173.05(c) section II entitled "Open-ended numerical ranges" only provides examples that deal with percentages, which are inherently bounded by 0 and 100.

In the arguments section (VII, page 6) of the appeal brief, applicant argued the following:

1. On page 6, that applicants tried to overcome the 35 U.S.C. 112, fourth paragraph rejection, but the amendment was denied entry.
2. On pages 6-9, that:
  - A. The examiner did not provide a prima facie case of scientific implausibility. (Page 7, paragraph 2)
  - B. The examiner's interpretation of the claimed invention is inconsistent with how one of skill in the art would have interpreted the claimed invention within the context of the disclosure. (Page 7, paragraph 3)
  - C. The phrase "signal light" limits the scope of the invention so that one of skill in the art would not construe the claim to mean any of the types of electromagnetic radiation that the examiner suggested. (Page 8)
  - D. One of skill in the art would not have construed " $f=0$ " (the frequency of light being equal to zero) to be in the claimed range. (Page 8, paragraphs 2 and 4)
  - E. "The Examiner suggests that the claimed signal to be amplified includes something one having ordinary skill in the art would not have understood as light, i.e., microwave radiation, radio waves, etc." (Page 8, last 3 lines)

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3. On page 9, that one of skill in the art would not have any problems making or using the invention.
4. On pages 10-12, that:
  - A. Examiner did not allege that a gain non-uniformity of 0% is inherently unbelievable, citing the case Cortright supra.
  - B. "it is not, repeat not, an object of the present invention to yield a gain non-uniformity of 0%."
  - C. One of skill in the art would not have construed 0% to be included in the claimed range.

Argument 1 is convincing, the rejection would be overcome by an amendment that consisted only of changing the dependencies of claims 39 and 41.

Argument 2A is incorrect, the examiner stated that  $f=0$  is mathematically undefined. One of ordinary skill in the art could make the inference that an invention with a mathematically undefined limitation is scientifically implausible, and definitely not enabled.

Argument 2B is unconvincing. It is not unreasonable to follow the applicant's open-ended range to its logical conclusion. Microwaves, radio waves and infrared signals are all encompassed by the limitation "greater than 1610 nm." One of ordinary skill in the art could only come up with two reasonable interpretations of the claim; 1) based on figure



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6 of the drawings, the applicant means 1610-1625 nm (in which case, why has the applicant not claimed this), or 2) based on what is actually claimed, the applicant means to encompass all electromagnetic radiation with a wavelength greater than 1610 nm.

Argument 2C is unconvincing. A signal may have any frequency. On page 8, applicants cite "a signal wavelength band including a wavelength region having a wavelength of 1610 nm or longer" as providing the context for "signal light". However, this quotation does not exclude radio waves, microwaves, or light with a wavelength of 1630 nm.

Regarding argument 2D, one of ordinary skill in the art would probably not have thought that the invention amplified light with a frequency of zero. This was included to show that the claimed invention included a physical impossibility.

Argument 2E is factually incorrect. One of skill in the art would definitely know that microwaves and radio waves are forms of light because all electromagnetic radiation is a form of light. Everything that travels at the speed of light and obeys Maxwell's equations IS light. One of ordinary skill in the art would know this.

Argument 3 is unconvincing. Similar to the other rejections, the issue is not whether one of skill in the art could build a device which meet the claims, but that the applicant is claiming devices which are not enabled by the specification.

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Argument 4A is unconvincing. Cortright is not applicable because the rejection given here is a 112 1<sup>st</sup>, not a 101. In Cortright, the board of appeals held that a 101 rejection was improper because the examiner did not show evidence for the disclosure being scientifically implausible, but said that a 112 1<sup>st</sup> for lack of enablement should have been given instead (page 1465).

Argument 4B is unconvincing. If 0% is not an object of the present invention then how can it be enabled, and furthermore, why is it claimed?

Argument 4C is unconvincing. Everyone in the art is trying to achieve the unrealizable, physically impossible goal of 0% gain non-uniformity. One of skill in the art would quite definitely wonder how much gain non-uniformity is the protected intellectual property of the applicant, i.e. What is the scope of the claims?

In conclusion, the applicant has claimed an open-ended infinite range. The applicant claims a wavelength range greater than 1610 nm, yet due to figure 6 of the drawings, has enabled to at most 1625 nm. The optical amplifier art has three principal goals 1) To increase the gain of optical amplifiers, 2) To increase the bandwidth of optical amplifiers, and 3) To decrease the gain non-uniformity. An ideal amplifier would be one that had a gain profile (a graph depicting gain plotted as a function of wavelength) which was infinitely high (unlimited gain), infinitely wide (unlimited bandwidth), and amplified all frequencies equally (gain non-uniformity of 0%). Everyone in the art is trying to

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achieve these goals of an ideal amplifier, and progress is made with every patent. There is no prior art that reads on the applicant's claimed invention. However, applicant should not be allowed claims for 1610 nm to infinity, when applicant only has enablement for 1610 nm to 1625 nm. Similarly, applicant should not be allowed claims for a gain non-uniformity of 18% to 0% when applicant only has enablement for 18% to say 12%.

Examiner is confident in his grounds of rejection, and believes he should be affirmed by the Board of Appeals.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

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For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

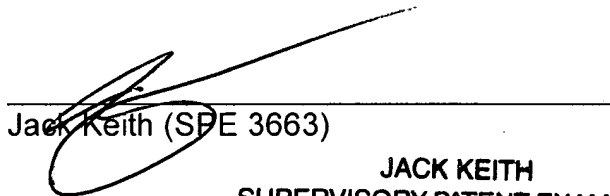
A handwritten signature in black ink, appearing to read 'Ari M. Diacou', written over a horizontal line.

Ari M. Diacou (Examiner)

Conferees:

A handwritten signature in black ink, appearing to read 'Deandra Hughes', written over a horizontal line.

Deandra Hughes (Primary Examiner 3663)

A handwritten signature in black ink, appearing to read 'Jack Keith', written over a horizontal line.

Jack Keith (SPE 3663)

**JACK KEITH**  
**SUPERVISORY PATENT EXAMINER**